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SUPPORT FOR NEW CLAIMS

Claims	Original Specification Support (Col:Line) PAGE/LINES 07/624,114 FWC on 08/16/1994
26. A collection of beads:comprised of different beads; wherein a plurality of the beads have at least one polymer of a specific sequence attached thereto; and wherein a plurality of the beads having at least one attached polymer are coded by an encoding system; and, the encoding system indicates the specific sequence of the polymer attached to a single bead.	The present invention provides a composition comprising a plurality of positionally distinguishable sequence specific reagents attached to a solid substrate, which reagents are capable of specifically binding to a predetermined subunit sequence of a preselected multisubunit length.... 3:21-32 The invention provides methods for sequencing a polymer . . . . In one embodiment, the substrates are beads. 5:1-15 It should be noted that multiple substrates may be simultaneously exposed to a single target sequence where each substrate is a duplicate of one another where, in combination, multiple substrates together provide the complete or desired subset of possible subsequences. 38:1-27 [E]ach probe might be attached to a single bead or substrate and the beads sorted by whether there is a binding interaction. Those beads which do bind might be encoded to indicate the subsequence specificity of reagents attached thereto. . . . [A] sorting system may be utilized . . . . 38:1-27 The . . . method utilizes synthetic beads or fibers. 76:1 – 77:10
27. The collection of claim 26, wherein the polymer attached to a single bead is an oligonucleotide having a given length; and wherein the oligonucleotide attached to a single bead is selected from the group consisting of all possible oligonucleotide sequences having the same number of nucleotides.	[T]he plurality of reagents comprise substantially all possible subsequences of said preselected length found in said target. 5:16-18 In a bead embodiment, at least some of the plurality of substrates have one subsequence specific reagent attached thereto, and the substrates are coded to indicate the sequence specificity of said reagent. 5:24-28 The enablement of the sequencing process by hybridization is based in large part upon the ability to synthesize a large number (e.g., to virtually saturate) of the possible overlapping sequence segments.... 7:8-11 Once the desired repertoire of possible oligomer sequences of a given length have been synthesized, this collection of reagents may be individually positionally attached to a substrate, thereby allowing a batchwise hybridization step. 34:34-38
28. The collection of claim 27, wherein at least about 20% of all possible oligonucleotide sequences having the same number of nucleotides are attached to a different single bead.	About 20% would be preferred.... 26:23-24

29. The collection of claim 27, wherein at least about 70% of all possible oligonucleotide sequences having the same number of nucleotides are attached to a different single bead.	In particular, although a substantial fraction will preferably be at least about 70%.... 26:19-25
30. The collection of claim 27, wherein the oligonucleotide sequences having the same number of nucleotides are at least 5 nucleotides long.	The number of possible five digit subsequences is 2^5 = 32. The number of possible different sequences 10 digits long is 2^{10} = 1,024. The five contiguous digit subsequences within a ten digit sequence number six, i.e., positioned at digits 1-5, 2-6, 3-7, 4-8, 5-9, and 6-10. 23:15-20 [I]n an absolute sequencing application, it is often useful to have virtually all of the possible oligonucleotides of a given length. 38:33-34
31. The collection of claim 27, wherein the oligonucleotide sequences having the same number of nucleotides are 8 nucleotides long.	The number of possible five digit subsequences is 2^5 = 32. The number of possible different sequences 10 digits long is 2^{10} = 1,024. The five contiguous digit subsequences within a ten digit sequence number six, i.e., positioned at digits 1-5, 2-6, 3-7, 4-8, 5-9, and 6-10. 23:15-20 As indicated above, there are 65,536 8-mers, 262,144 9-mers, 1,048,576 10-mers.... 38:35-36
32. The collection of claim 27, wherein the oligonucleotide sequences having the same number of nucleotides are 9 nucleotides long.	As indicated above, there are 65,536 8-mers, 262,144 9-mers, 1,048,576 10-mers.... 38:35-36
33. The collection of claim 27, wherein the oligonucleotide sequences having the same number of nucleotides are at least 10 nucleotides long.	As indicated above, there are 65,536 8-mers, 262,144 9-mers, 1,048,576 10-mers.... 38:35-36
34. The collection of claim 27, wherein at least 10,000 of all the possible oligonucleotide sequences having the same number of nucleotides are attached to a different single bead.	[O]ligonucleotide probes ... including numbers in excess of about 10^2, 10^3, 10^4, 10^5, 10^6, or even more.... 13:15-17
35. The collection of claim 27, wherein at least 100,000 of all the possible oligonucleotide sequences having the same number of nucleotides are attached to a different single bead.	[O]ligonucleotide probes ... including numbers in excess of about 10^2, 10^3, 10^4, 10^5, 10^6, or even more.... 13:15-17
36. The collection of claim 27, wherein at least 1,000,000 of all the possible oligonucleotide sequences having the same number of nucleotides are attached to a different single bead.	[O]ligonucleotide probes ... including numbers in excess of about 10^2, 10^3, 10^4, 10^5, 10^6, or even more.... 13:15-17
37. The collection of claim 26, wherein the polymer is selected from the group consisting of polynucleotides and polypeptides.	The present invention provides a composition comprising a plurality of positionally distinguishable sequence specific reagents attached to a solid subtrate.... In some embodiments, the subunit sequence is a polynucleotide or a polypeptide. 3:21-28 The specific sequence recognition reagents will typically

	be oligonucleotide probes which hybridize with specificity to subsequences found on the target sequence. 11:12-15 These reagents will take the form, typically, of proteins exhibiting binding specificity.... 44:30-33
38. The collection of claim 26, wherein the polymer is a protein selected from the group consisting of enzyme binding sites and antibody binding sites.	[T]he nonpolynucleotide sequences typically require other sequence recognition reagents. These reagents will take the form, typically, of proteins exhibiting binding specificity, e.g., enzyme binding site or antibody binding sites. 44:28-33
39. The collection of claim 26, wherein a plurality of beads are comprised of a glass surface and amines of poly-aminopropyltriethoxysilane thereon, and polymers are attached through amines on the glass surface.	The ... "standard VLSIPS" method... involves applying amino-propyltriethoxysilane to a glass surface. 75: 34-37 The polymeric substrate approach involves either of two ways of generating a polymeric substrate. The first uses a high concentration of aminopropyltriethoxysilane.... This... provides a high density of amines on the surface of the glass. 76:1-7
40. The collection of claim 26, wherein the a plurality of beads are comprised of a surface and hydroxyl groups of an acrylic acid polymer thereon, and polymers are attached through hydroxyl groups on the surface.	The second method involves either the coating or covalent binding of an appropriate acrylic acid polymers onto the substrate surface. In particular... a monomer... is used to generate a high density of hydroxyl groups on the substrate surface, allowing for the formation of phosphate bonds.... Here the building up of, e.g., a DNA oligomer, can be started immediately since phosphate bonds to the surface can be accomplished in the first step with no need for modification. 76:11-37
41. The collection of claim 26, wherein the polymers are oligodeoxyribonucleotides, a plurality of a beads are comprised of a surface and a coating of an organic hydrophilic layer terminating in hydroxyl groups, and phosphates of the oligodeoxyribonucleotides are immediately linked to the hydroxyl groups.	The fourth method uses beads or fibers. This would use another substrate, such as teflon copolymer graft bead or fiber, which is covalently coated with an organic layer (hydrophilic) terminating in hydroxyl sites... allowing for immediate phosphate linkages.... 77:3-7
42. The collection of claim 26, wherein the encoding system is selected from the group consisting of a magnetic system, a shape encoding system, a color encoding system, and combinations thereof.	An encoding system may include a magnetic system, a shape encoding system, a color encoding system, or a combination of these, or any other encoding system. 38:22-24
43. A system for determining the nucleotide sequence of a target comprising: (a) the collection of beads according to claim 27, wherein the attached oligonucleotides are complementary to substantially all possible oligonucleotide target sequences of a given length; (b) an apparatus that sorts single beads that have bound an oligonucleotide target from single beads that have not bound an oligonucleotide target; and (c) an apparatus that decodes by the encoding system to indicate the oligonucleotide sequence attached to a single bead.	Thus, a less expensive, highly reliable, and labor efficient means for sequencing biological macromolecules is needed.... In particular, an automated system would improve the reproducibility and accuracy of procedures. The present invention satisfies these and other needs.... The present invention provides improved methods useful for de novo sequencing of an unknown polymer sequence, for verification of known sequences, for fingerprinting polymers, and for mapping homologous segments within a sequence. 2:26-3:2. It should be noted that multiple substrates may be simultaneously exposed to a single target sequence where each substrate is a duplicate of one another where, in combination, multiple substrates together provide the

	complete or desired subset of possible subsequences. This provides the opportunity to overcome a limitation of the density of positions on a single substrate by using multiple substrates. 38:1-8 In the extreme case, each probe might be attached to a single bead or substrate and the beads sorted by whether there is a binding interaction. Those beads which do bind might be encoded to indicate the subsequence specificity of reagents attached thereto. Then the target may be bound to the whole collection of beads and those beads that have appropriate specific reagents on them will bind to target. 38:8-15 Then a sorting system may be utilized to sort those beads that actually bind the target from those that do not. This may be accomplished by presently available cell sorting devices or a similar apparatus.... [T]he encoding scheme may be read off to determine the specificity of the reagent on the bead. 38:15-27
44. The system of claim 43, wherein at least one of the targets is labeled with at least one detectable marker.	The label used to detect the target sequences will be determined, in part, by the detection methods being applied.... 40:1-5 The target polynucleotide may be labeled by any of a number of convenient detectable markers. A fluorescent label is preferred.... 85: 36-38
45. The system of claim 44, wherein the detectable marker is selected from the group consisting of fluorescent labels, radioisotopes, chemiluminescent compounds, bioluminescent sources, labeled binding proteins, heavy metal atoms, spectroscopic markers, magnetic labels, linked enzymes, chromogens, dyes, and spin labels.	Other potential labeling moieties include, radioisotopes, chemiluminescent compounds, labeled binding proteins, heavy metal atoms, spectroscopic markers, magnetic labels, and linked enzymes.... An intercalative dye... may be used.... Suitable chromogens will include molecules and compounds which absorb light in a distinctive range...or emit light.... 86:2-28 Alternatively, luciferins may be used be used in conjunction with luciferase or lucigenins to provide bioluminescence. Spin labels are provided by reporter molecules with an unpaired electron spin.... 88:34-38 Exemplary spin labels include organic free radicals, transitional metal complexes, particularly vanadium, copper, iron, and manganese, and the like. Exemplary spin labels include nitroxide free radicals. 89:1-4
46. The collection of claim 26, wherein the polymer attached to a single bead is an oligonucleotide probe having a given length.	The specific sequence recognition reagents will typically be oligonucleotide probes which hybridize with specificity to subsequences found on the target sequence. 11:12-15 The length of oligonucleotides used in sequencing applications will be selected on criteria.... 37:1-3

47. A system for fingerprinting, comprising: (a) the collection of beads according to claim 46, wherein the attached oligonucleotide probes of a specific sequence are complementary to oligonucleotide targets; (b) an apparatus that sorts single beads that have bound an oligonucleotide target from beads that have not bound an oligonucleotide target; and (c) an apparatus that decodes the encoding system, to indicate the oligonucleotide sequence attached to a single bead.	The present invention provides improved methods useful for de novo sequencing of an unknown polymer sequence, for verification of known sequences, for fingerprinting polymers, and for mapping homologous segments within a sequence. 2:26-3:2 Preferably, the plurality of reagents comprise substantially all possible subsequences of said preselected length found in said target.... In a bead embodiment, at least some of the plurality of substrates have one subsequence specific reagent attached thereto, and the substrates are coded to indicate the sequence specificity of said reagent. 5:14-28 Once the desired repertoire of possible oligomer sequences of a given length have been synthesized, this collection of reagents may be individually positionally attached to a substrate, thereby allowing a batchwise hybridization step. 34:34-38 It should be noted that multiple substrates may be simultaneously exposed to a single target sequence where each substrate is a duplicate of one another where, in combination, multiple substrates together provide the complete or desired subset of possible subsequences. This provides the opportunity to overcome a limitation of the density of positions on a single substrate by using multiple substrates. 38:1-8 In the extreme case, each probe might be attached to a single bead or substrate and the beads sorted by whether there is a binding interaction. Those beads which do bind might be encoded to indicate the subsequence specificity of reagents attached thereto. Then the target may be bound to the whole collection of beads and those beads that have appropriate specific reagents on them will bind to target. 38:8-15 Then a sorting system may be utilized to sort those beads that actually bind the target from those that do not. This may be accomplished by presently available cell sorting devices or a similar apparatus.... [T]he encoding scheme may be read off to determine the specificity of the reagent on the bead. 38:15-27 The hybridization conditions between probe and target should be selected such that the specific recognition interaction.... 41:20-30 These reagents will take the form, typically, of proteins.... 44:30-33 [A]t least four different substrate preparation procedures... synthetic beads or fibers. 75:30-33 The fourth method uses beads or fibers. 77:3-10

48. The system of claim 47, wherein at least one of the targets is labeled with at least one detectable marker.	The target polynucleotide may be labeled by any of a number of convenient detectable markers. A fluorescent label is preferred.... 85: 36-38 The label used to detect the target sequences will be determined, in part, by the detection methods being applied.... 40:1-5
49. The system of claim 47, wherein the detectable marker is selected from the group consisting of fluorescent labels, radioisotopes, chemiluminescent compounds, bioluminescent sources, labeled binding proteins, heavy metal atoms, spectroscopic markers, magnetic labels, linked enzymes, chromogens, dyes, and spin labels.	Other potential labeling moieties include, radioisotopes, chemiluminescent compounds, labeled binding proteins, heavy metal atoms, spectroscopic markers, magnetic labels, and linked enzymes.... An intercalative dye... may be used.... Suitable chromogens will include molecules and compounds which absorb light in a distinctive range...or emit light.... 86:2-28 Alternatively, luciferins may be used be used in conjunction with luciferase or lucigenins to provide bioluminescence. Spin labels are provided by reporter molecules with an unpaired electron spin.... 88:34-38 Exemplary spin labels include organic free radicals, transitional metal complexes, particularly vanadium, copper, iron, and manganese, and the like. Exemplary spin labels include nitroxide free radicals. 89:1-4
50. The system of claim 47, wherein the oligonucleotide probes and the targets are greater than 25 nucleotides, and different fluorescent labels are the detectable markers.	The target polynucleotide may be labeled by any of a number of convenient detectable markers. A fluorescent label is preferred.... 85: 36-38 [I]f oligonucleotide probes are being used, their lengths should be apporximately comparable and will be selected to hybridize.... [T]he target and oligonucleotide probes are of lengths typically greater than about 25 nucleotides. 50:8-13 In another embodiment, different targets may be simultaneously sequenced where each target has a different label. 86:18-20
51. The collection of claim 26, wherein the polymer is selected from the group consisting of enzyme binding sites and antibody binding sites.	[T]he nonpolynucleotide sequences typically require other sequence recognition reagents. These reagents will take the form, typically, of proteins exhibiting binding specificity, e.g., enzyme binding site or antibody binding sites. 44:28-33
52. A system for fingerprinting, comprising: (a) the collection of beads according to claim 26, wherein the polymer is a polypeptide able to specifically bind a target; (b) an apparatus that sorts single beads that have bound a target from beads that have not bound a target; and (c) an apparatus that decodes the encoding system to indicate the polypeptide sequence attached to a single bead.	The present invention provides improved methods useful for de novo sequencing of an unknown polymer sequence, for verification of known sequences, for fingerprinting polymers, and for mapping homologous segments within a sequence. 2:26-3:2 Preferably, the plurality of reagents comprise substantially all possible subsequences of said preselected length found in said target.... In a bead embodiment, at least some of the plurality of substrates have one subsequence specific reagent attached thereto, and the substrates are coded to indicate the sequence

	specificity of said reagent. 5:14-28 Once the desired repertoire of possible oligomer sequences of a given length have been synthesized, this collection of reagents may be individually positionally attached to a substrate, thereby allowing a batchwise hybridization step. 34:34-38 It should be noted that multiple substrates may be simultaneously exposed to a single target sequence where each substrate is a duplicate of one another where, in combination, multiple substrates together provide the complete or desired subset of possible subsequences. This provides the opportunity to overcome a limitation of the density of positions on a single substrate by using multiple substrates. 38:1-8 In the extreme case, each probe might be attached to a single bead or substrate and the beads sorted by whether there is a binding interaction. Those beads which do bind might be encoded to indicate the subsequence specificity of reagents attached thereto. Then the target may be bound to the whole collection of beads and those beads that have appropriate specific reagents on them will bind to target. 38:8-15 Then a sorting system may be utilized to sort those beads that actually bind the target from those that do not. This may be accomplished by presently available cell sorting devices or a similar apparatus.... [T]he encoding scheme may be read off to determine the specificity of the reagent on the bead. 38:15-27 The hybridization conditions between probe and target should be selected such that the specific recognition interaction.... 41:20-30 These reagents will take the form, typically, of proteins.... 44:30-33 [A]t least four different substrate preparation procedures... synthetic beads or fibers. 75:30-33 The fourth method uses beads or fibers. 77:3-10
53. The collection of claim 26, wherein a plurality of beads are comprised of a TEFLON copolymer graft surface and a coating of a hydrophilic organic layer terminating in hydroxyl sites.	This would use another substrate, such as a teflon copolymer graft bead or fiber, which is covalently coated with an organic layer (hydrophilic) terminating in hydroxyl sites.... 77: 3-7
54. The collection of claim 27, wherein a plurality of the attached oligonucleotides are comprised of at least one nucleotide analogue.	By use of non-natural targeting reagents, e.g., unusual nucleotide analogues which pair with other natural nucleotide interactions.... 48:26-33

55. The collection of claim 27, wherein a plurality of the different beads are reusable; thereby allowing specific interactions between the polymer attached to a single bead and its target to be disrupted, the single bead treated, whereby a renewed plurality of beads equivalent to an unused plurality of beads is made by such treatment.	As with the sequencing application, the fingerprinting usages may also take advantage of the reusability of the substrate. In this way, the interactions can be disrupted, the substrate treated, and the renewed substrate is equivalent to an unused substrate. 51:29-33 Where a substrate is made with specific reagents that are relatively insensitive to the handling and processing steps involved in a single cycle of use, the substrate may often be reused. 93:9-12
56. The collection of claim 27, wherein the given length of the oligonucleotide attached to a plurality of beads is selected from the group consisting of oligonucleotide sequences having a variable number of nucleotides.	It will be recognized that the probe oligonucleotides will preferably, but need not necessarily, be of identical length.... [B]ut may contain a plurality of probes of a known sequence. 26:13-19 [F]ingerprint probes of various lengths, or with specific defined non-matches may be used. 39:30-31
57. A collection of fibers comprised of different fibers; wherein a plurality of the fibers have at least one polymer of a specific sequence attached thereto; and wherein a plurality of the fibers having at least one attached polymer are coded by an encoding system; and, the encoding system indicates the specific sequence of the polymer attached to a single fiber.	The present invention provides improved methods useful for de novo sequencing of an unknown polymer sequence, for verification of known sequences, for fingerprinting polymers, and for mapping homologous segments within a sequence. 2:26-3:2 The present invention provides a composition comprising a plurality of positionally distinguishable sequence specific reagents attached to a solid substrate, which reagents are capable of specifically binding to a predetermined subunit sequence of a preselected multisubunit length.... 3:21-32 The invention provides methods for sequencing a polymer . . . . In one embodiment, the substrates are beads. 5:1-15 It should be noted that multiple substrates may be simultaneously exposed to a single target sequence where each substrate is a duplicate of one another where, in combination, multiple substrates together provide the complete or desired subset of possible subsequences. 38:1-27 [E]ach probe might be attached to a single bead or substrate and the beads sorted by whether there is a binding interaction. Those beads which do bind might be encoded to indicate the subsequence specificity of reagents attached thereto. . . . [A] sorting system may be utilized . . . . 38:1-27 [A]t least four different substrate preparation procedures... synthetic beads or fibers. 75:30-33 The fourth method uses beads or fibers. 77:3-10

58. The collection of claim 57, wherein the polymer attached to a single fiber is an oligonucleotide having a given length; and, wherein, the oligonucleotide attached to a single fiber is selected from the group consisting of all possible oligonucleotide sequences having the same number of nucleotides.	[T]he plurality of reagents comprise substantially all possible subsequences of said preselected length found in said target. 5:16-18 In a bead embodiment, at least some of the plurality of substrates have one subsequence specific reagent attached thereto, and the substrates are coded to indicate the sequence specificity of said reagent. 5:24-28 The enablement of the sequencing process by hybridization is based in large part upon the ability to synthesize a large number (e.g., to virtually saturate) of the possible overlapping sequence segments.... 7:8-11 Once the desired repertoire of possible oligomer sequences of a given length have been synthesized, this collection of reagents may be individually positionally attached to a substrate, thereby allowing a batchwise hybridization step. 34:34-38
59. The collection of claim 58, wherein at least about 25% of all possible oligonucleotide sequences having the same number of nucleotides are attached to a different single fiber.	In other embodiments, the reagents represent[ ] at least about 25% of the possible subsequences of said preselected length. 3:36-38
60. The collection of claim 58, wherein at least about 70% of all possible oligonucleotide sequences having the same number of nucleotides are attached to a different single fiber.	In particular, although a substantial fraction will preferably be at least about 70%.... 26:19-25
61. The collection of claim 57 wherein the polymer is selected from the group consisting of polynucleotides and polypeptides.	The present invention provides a composition comprising a plurality of positionally distinguishable sequence specific reagents attached to a solid subtrate.... In some embodiments, the subunit sequence is a polynucleotide or a polypeptide. 3:21-28 The specific sequence recognition reagents will typically be oligonucleotide probes which hybridize with specificity to subsequences found on the target sequence. 11:12-15 These reagents will take the form, typically, of proteins exhibiting binding specificity.... 44:30-33
62. The collection of claim 57, wherein the polymer is a protein selected from the group consisting of enzyme binding sites and antibody binding sites.	[T]he nonpolynucleotide sequences typically require other sequence recognition reagents. These reagents will take the form, typically, of proteins exhibiting binding specificity, e.g., enzyme binding site or antibody binding sites. 44:28-33
63. A system for determining the nucleotide sequence of a target comprising: (a) the collection of fibers according to claim 57, wherein the attached oligonucleotides are complementary to substantially all possible oligonucleotide target sequences of a given length;	The present invention provides improved methods useful for de novo sequencing of an unknown polymer sequence, for verification of known sequences, for fingerprinting polymers, and for mapping homologous segments within a sequence. 2:26-3:2

(b) an apparatus that sorts single fibers that have bound an oligonucleotide target from single beads that have not bound an oligonucleotide target; and (c) an apparatus that decodes the encoding system to indicate the oligonucleotide sequence attached to a single fiber.	Preferably, the plurality of reagents comprise substantially all possible subsequences of said preselected length found in said target.... In a bead embodiment, at least some of the plurality of substrates have one subsequence specific reagent attached thereto, and the substrates are coded to indicate the sequence specificity of said reagent. 5:14-28 Once the desired repertoire of possible oligomer sequences of a given length have been synthesized, this collection of reagents may be individually positionally attached to a substrate, thereby allowing a batchwise hybridization step. 34:34-38 It should be noted that multiple substrates may be simultaneously exposed to a single target sequence where each substrate is a duplicate of one another where, in combination, multiple substrates together provide the complete or desired subset of possible subsequences. This provides the opportunity to overcome a limitation of the density of positions on a single substrate by using multiple substrates. 38:1-8 In the extreme case, each probe might be attached to a single bead or substrate and the beads sorted by whether there is a binding interaction. Those beads which do bind might be encoded to indicate the subsequence specificity of reagents attached thereto. Then the target may be bound to the whole collection of beads and those beads that have appropriate specific reagents on them will bind to target. 38:8-15 Then a sorting system may be utilized to sort those beads that actually bind the target from those that do not. This may be accomplished by presently available cell sorting devices or a similar apparatus.... [T]he encoding scheme may be read off to determine the specificity of the reagent on the bead. 38:15-27 The hybridization conditions between probe and target should be selected such that the specific recognition interaction.... 41:20-30 These reagents will take the form, typically, of proteins.... 44:30-33
64. The collection of the fibers of claim 57, wherein the polymer attached to a single fiber is an oligonucleotide probe having a given length.	[R]eagents will typically be oligonucleotide probes which hybridize with specificity to subsequences found on the target sequence. 11:11-15 The length of the oligonucleotide used in sequencing applications will be selected on criteria determines to some extent by the practical limits discussed above. 37:1-3

65. A system for fingerprinting, comprising: (a) the collection of fibers according to claim 64, wherein the attached oligonucleotide probes of a specific sequence are complementary to oligonucleotide targets; (b) an apparatus that sorts single fibers that have bound an oligonucleotide target from fibers that have not bound an oligonucleotide target; and (c) an apparatus that decodes the encoding system to indicate the oligonucleotide sequence attached to a single fiber.	The present invention provides improved methods useful for de novo sequencing of an unknown polymer sequence, for verification of known sequences, for fingerprinting polymers, and for mapping homologous segments within a sequence. 2:26-3:2 Preferably, the plurality of reagents comprise substantially all possible subsequences of said preselected length found in said target.... In a bead embodiment, at least some of the plurality of substrates have one subsequence specific reagent attached thereto, and the substrates are coded to indicate the sequence specificity of said reagent. 5:14-28 Once the desired repertoire of possible oligomer sequences of a given length have been synthesized, this collection of reagents may be individually positionally attached to a substrate, thereby allowing a batchwise hybridization step. 34:34-38 It should be noted that multiple substrates may be simultaneously exposed to a single target sequence where each substrate is a duplicate of one another where, in combination, multiple substrates together provide the complete or desired subset of possible subsequences. This provides the opportunity to overcome a limitation of the density of positions on a single substrate by using multiple substrates. 38:1-8 In the extreme case, each probe might be attached to a single bead or substrate and the beads sorted by whether there is a binding interaction. Those beads which do bind might be encoded to indicate the subsequence specificity of reagents attached thereto. Then the target may be bound to the whole collection of beads and those beads that have appropriate specific reagents on them will bind to target. 38:8-15 Then a sorting system may be utilized to sort those beads that actually bind the target from those that do not. This may be accomplished by presently available cell sorting devices or a similar apparatus.... [T]he encoding scheme may be read off to determine the specificity of the reagent on the bead. 38:15-27 The hybridization conditions between probe and target should be selected such that the specific recognition interaction.... 41:20-30 These reagents will take the form, typically, of proteins.... 44:30-33
66. The collection of claim 57, wherein a plurality of fibers are comprised of a TEFLON copolymer graft surface and a coating of a hydrophilic organic layer terminating in hydroxyl sites.	This would use another substrate, such as a teflon copolymer graft bead or fiber, which is covalently coated with an organic layer (hydrophilic) terminating in hydroxyl sites.... 77: 3-7

67. The collection of fibers of claim 58, wherein a plurality of the attached oligonucleotides are comprised of at least one nucleotide analogue.	By use of non-natural targeting reagents, e.g., unusual nucleotide analogues which pair with other natural nucleotide interactions.... 48:26-33
68. The collection of claim 57, wherein a plurality of the different fibers are reusable; thereby allowing specific interactions between the polymer attached to a single fiber and its target to be disrupted, the single fiber treated, whereby a renewed plurality of fibers equivalent to an unused plurality of fibers is made by such treatment.	As with the sequencing application, the fingerprinting usages may also take advantage of the reusability of the substrate. In this way, the interactions can be disrupted, the substrate treated, and the renewed substrate is equivalent to an unused substrate. 51:29-33 Where a substrate is made with specific reagents that are relatively insensitive to the handling and processing steps involved in a single cycle of use, the substrate may often be reused. 93:9-12
69. The collection of claim 58, wherein the given length of the oligonucleotide attached to a plurality of fibers is selected from the group consisting of oligonucleotide sequences having a variable number of nucleotides.	It will be recognized that the probe oligonucleotides will preferably, but need not necessarily, be of identical length.... [B]ut may contain a plurality of probes of a known sequence. 26:13-19 [F]ingerprint probes of various lengths, or with specific defined non-matches may be used. 39:30-31